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OAK RIDGE NATIONAL LABORATORY

CENTRAL FILES NUMBER

48-9-31

-8-23, 1948

A SUMMARY OF CONFERENCE

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LIQUID WASTE DISPOSAL

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Held at

OAK RIDGE NATIONAL LABORATORY  
Health Physics Building  
Oak Ridge, Tennessee

AUGUST 23 - 24, 1948

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CLASSIFICATION CANCELLED

DATE 8/28/67

For The Atomic Energy Commission

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Prepared Chief, Declassification Branch

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ChemRisk Document No. 1440

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SUMMARY OF MEETING ON LIQUID WASTE DISPOSAL  
OAK RIDGE NATIONAL LABORATORY  
AUGUST 23-24, 1948

The following is a summary of the information presented to the Committee on Waste Disposal at a meeting held on August 23 and 24. The summary has been prepared in terms of the essential data rather than in chronological order as given at the meeting.

The waste disposal activities at Oak Ridge may be divided into the following categories: (1) Treatment of contaminated air, (2) Disposal of contaminated liquids, and (3) Disposal of contaminated solids.

Treatment of Contaminated Air

At the present time approximately 800 curies of activity is dispersed during the one day per month dissolution step of the Rala operations through stacks at the Oak Ridge National Laboratory. Approximately 500 curies per day of activity results from the irradiated argon in the cooling air used in the pile and the dissolver-off gases and chemical processing operations of the Technical Division. These gases (35,000 cubic feet per minute) are dispersed through normal mixing as they leave the stack. Under the supervision of the Health Physics Division of the Oak Ridge National Laboratory, monitoring positions are established and operated, which indicate the extent of contamination in the air. There are no indications at present that an immediate health hazard is developing. However, this point is being established by an extensive investigation of meteorological conditions, as described below.

Disposal of Solid Waste

The solids consist of trash, contaminated equipment, and scrap materials. The trash and some contaminated equipment is being buried. The contaminated scrap metal consists of material slightly above background activity, material above background but contaminated below health tolerance, and materials contaminated above health tolerance. At the present time the material in all three categories is being stored, pending the study indicated below.

Disposal of Liquid Waste

Liquids being disposed of at the present time consist of slightly contaminated chemical wastes and uranium-containing waste. The waste containing uranium is stored in 170,000 gallon concrete tanks at the Oak Ridge National Laboratory. Most of the uranium in these wastes has been precipitated by the addition of sodium hydroxide and of sodium carbonate, and the supernatant is decanted off to provide additional

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space in the tanks. The supernatant is then handled as a contaminated chemical waste. No studies are being made at the laboratory at the present time on the method of removal of uranium from the tanks. It is felt that the solution of the Hanford waste problem will yield considerable data on the ultimate disposal of the 145 tons of uranium metal.

The chemical wastes are fed into a series of buried concrete tanks, and then into a settling basin, and finally into White Oak Creek. Such decontamination as is achieved depends upon a holdup in the tanks, which permits the short half-life species to decay. The remaining activity which results from long half-life species as Ru, Co, Cs, Sr, Y, etc., is at a comparatively low level and is disposed of through the settling basin and finally White Oak Creek. The chemical waste fed into the storage tanks averages 30,000 gallons per week. Prior to the disposal through the settling basin and into White Oak Creek, the supernatant is diluted with an additional 500,000 gallons per day, thus the activities per unit volume in the White Oak basin are below a minimum permissible exposure based on the assumption that an individual could live continuously in the water for a lifetime. It is estimated that approximately two curies of activity per day is disposed of into the White Oak basin. It is believed that disposal of five curies per day would still permit the above assumed exposure.

#### Effectiveness of Present Disposal System

In order to determine the effectiveness of the present disposal system, a program has been initiated which will determine the effects of present disposal to the air, to surface water, and to subterranean water. The program is a joint one undertaken by Oak Ridge National Laboratory, United States Public Health Service, Tennessee Valley Authority, the University of Tennessee, and the Atomic Energy Commission. The group intends to study meteorological conditions to an elevation of 2,000 feet, the maximum height to which local topographical conditions may be expected to affect air temperature and air currents, geological conditions existing in the area, and the biological effects, if any, on animal and plant life in the drainage area immediately adjacent to the Laboratory and in the TVA system from Norris Dam to the Watts Bar Dam.

#### Current and Future Research Program

The Laboratory has approached the problem of separating and/or concentrating fission products from liquid wastes by ion exchange, precipitation, and evaporation.

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Ion exchange research is aimed at separation of the fission products from the common chemical salts present and the reclamation of the salts for future use. To this end the Chemistry Division has been engaged in obtaining the basic information on various adsorbing and scavenging agents and general features of an ion exchange process. The work has been centered chiefly about the rare earth elements and those elements which occur as fission products which do not belong to the rare earth group. In addition, the Chemistry Division is studying the properties and characteristics of the scavenging agents to be used to separate troublesome elements as Ru, Cs, and Te which are not picked up by the ion exchange process. These data will be essential before complete decontamination of wastes can be accomplished and before these fission products can be isolated, should this be desired.

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The Technical Division/utilizing this basic information and is developing an ion exchange process for separation of specific fission species in the chemical wastes arising from the 25 chemical processes associated with the high flux pile. Feed material in this ion exchange work is a simulated raffinate solution from the solvent extraction process utilized to separate uranium from the expended fuel elements. The Technical Division has obtained an average analysis of the existing chemical wastes in the present disposal system of the Oak Ridge National Laboratory and is developing an ion exchange process which will reclaim and reduce the volume of the activities in the present chemical wastes. This information will be available for use for either the modification of the present disposal system or any new disposal system which will be required for the permanent laboratory. In addition, the experience obtained by the Operations Division in connection with the present disposal system will be available to the architect-engineer contractor charged with the responsibility for plans for the new laboratory.

#### Volume Reduction

Because of an approaching critical shortage of waste storage capacity at Oak Ridge National Laboratory, the Technical Division is investigating evaporation as a method of immediate reduction of liquid waste volume. Evaporation is considered only as a temporary expedient until a satisfactory long range method of disposing of waste can be developed. An evaporation system can be constructed in three or four months, and can be utilized for perhaps two or three years as a stop gap operation. The evaporation equipment is being designed to handle 50,000 gallons of feed solution per week with a volume reduction of 20:1 and with a reduction of the activity of  $10^3$  to  $10^4$ . The design will provide for minimum entrainment of fission fragments in the condensate. Monitoring facilities will be provided to establish adequate health protection to personnel.

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The Committee was impressed favorably with the present activities of the laboratory on the problem of waste disposal and with the interest shown by the various divisions which reported on future studies of the problem. The extent to which the fundamental information, provided by the Chemistry Division, is being utilized by the Technical Division was noted. It is understood that the Committee plans to include in their recommendations, either by inference or by direct note, that additional work in this field could be assigned to the Oak Ridge National Laboratory.

September 2, 1948

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